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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/786,479	02/26/2004	Nobuhiro Ohkubo	204552031400	3112

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EXAMINER	
VAN ROY, TOD THOMAS	
ART UNIT	**PAPER NUMBER**
2828	

DATE MAILED: 09/01/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/786,479	OHKUBO ET AL.	
	Examiner	Art Unit	
	Tod T. Van Roy	2828	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *26 June 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-9 and 16-22* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-9 and 16-22* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *06/26/2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Drawings

Figures 8 and 9 are accepted.

Response to Arguments

Applicant's arguments filed 06/26/2006 have been fully considered but they are not persuasive.

Firstly, the applicant has stated that the cited reference, JP 2002-026450 (JP450), does not teach the 2nd clad layer of the 2nd conductivity type to have As atoms in the area near a laser resonator end face. The examiner disagrees with the applicant. The language of claim one states the presence of at least two clad layers, a 1st clad layer of a 1st conductivity type, and a 2nd clad layer of a 2nd conductivity type.

The limitation "a 2nd clad layer of a 2nd conductivity type" can be interpreted in more than one way. First, it may mean that there are at least two clad layers, one of which is of the 2nd conductivity type (the others could be of the 1st type or otherwise). Alternatively, it may mean that there are at least two clad layers, both of which are of the 2nd conductivity type (the claimed clad layer being the 2nd of the two similar layers). The JP450 reference teaches multiple clad layers; there being two clad layers both of the 2nd conductivity type (the first is #24, the second being #28). JP450 uses the same designation as the claim "2nd clad layer of the 2nd conductivity type" in describing layer #28, which as shown in Fig.1, does not contain As. However, the examiner has taken the claim language (2nd clad layer of the 2nd conductivity type) to mean there must be at

least two cladding layers in the device, the 2nd of which must be of the 2nd conductivity type. Since JP450 teaches a 1st clad layer of the 1st conductivity type (#22), the claim limitation is satisfied by relying on layer #24 (of the 2nd conductivity type) as being the 2nd clad layer of the 2nd conductivity type. This layer is clearly shown in Fig.1 to contain As atoms in the area near a laser resonator end face.

Next, the applicant has stated that JP450 does not teach the photoluminescence (PL) near to the laser resonator face to have a peak wavelength smaller than in the inner area. The examiner agrees that the JP450 does not discuss a PL measurement. However, this limitation is inherently met. As the applicant has pointed out (see Remarks, pg.4 para.1), JP450 discloses the bandgap in the window region is larger than in the inner area of layer #23 (see JP450 [0019]). Layer #23 functions as the active area in this device (see inlet to Fig.1, disclosing the double quantum well structure). The wavelength of light emitted from a quantum well type diode laser is proportional to the bandgap of the material constituting the quantum well ($E=(h*c)/\lambda$, where E is the bandgap). Therefor, if the bandgap is large, the emitted wavelength will be small, and vice versa. As JP450 teaches the bandgap in the window region to be larger than in the inner area, the wavelength emitted in the window region will be smaller than that emitted in the inner area. A PL measurement is a measurement of the emission from the quantum well material using light as a stimulus. This measurement would inherently show, due to the above-described bandgaps, that the light emitted from the window region would have a smaller wavelength than the light emitted from the inner area, meeting the claim limitation.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-2, 4, 7-8, 20, and 22 are rejected under 35 U.S.C. 102(b) as being anticipated by Kazumasa et al. (applicant submitted prior art, JP 2002-026450).

With respect to claim 1, Kazumasa discloses a semiconductor laser device which is made from AlGaInP based material (defined in spec as being GaInP or AlGaInP, [0038]) comprising: a first clad layer of a first conductivity type (AlGaInP [0025]), an active layer ([0028]) and a second clad layer of a second conductivity type (AlGaInP [0031]) that are formed over a semiconductor substrate ([0021]), wherein a portion of said active layer in an area near a laser resonator end face has a peak wavelength in photoluminescence (PL) that is smaller than a peak wavelength in PL in a portion of said active layer in a laser resonator inner area ([0019]), and the second clad layer of the second conductivity type located in the area near a laser resonator end face contains As atoms (fig.2 #24, As taught as an impurity source [0045]).

With respect to claim 2, Kazumasa discloses the As atom concentration in the second clad layer of the second conductivity type in the area near a laser resonator end face is higher than an As atom concentration in the second clad layer of the second

conductivity type in the laser resonator inner area (fig.2, As implant only on edges, so area near resonator would inherently have more As than a central portion of the laser resonator).

With respect to claim 4, Kazumasa discloses the impurity atoms having the second conductivity, contained in the second clad layer of the second conductivity type in the area near a laser resonator end face, are the same as impurity atoms having the second conductivity contained in the second clad layer of the second conductivity type in the laser resonator inner area (second clad layer #24 doping taught to be same throughout entire structure).

With respect to claim 7, Kazumasa discloses the impurity atoms having the second conductivity, contained in the second clad layer of the second conductivity type in the area near a laser resonator end face and the laser resonator inner area have a concentration in a range from not less than 1E18 to not more than 5E18 ([0032], range taught is from 1E17 to 5E18).

With respect to claim 8, Kazumasa discloses a GaAs contact layer of the second conductivity type formed over the clad layer of the second conductivity type in the area near a laser resonator end face and the laser resonator inner area (fig.3 #29, GaAs [0060]), and a GaInP intermediate layer of the second conductivity type formed between the second clad layer of the second conductivity type and the GaAs contact layer of the second conductivity type in the laser resonator inner area (fig.3 #25, InGaP [0035]).

Claims 20 and 22 are rejected for the same reasons outlined in the rejection to claim 8 above.

Claims 1-2, and 9 are rejected under 35 U.S.C. 102(b) as being anticipated by Kiyohisa et al. (applicant submitted prior art, JP 09-326526).

With respect to claim 1, Kiyohisa discloses a semiconductor laser device which is made from AlGaInP based material (defined in spec as being GaInP or AlGaInP, [0038]) comprising: a first clad layer of a first conductivity type (fig.1 #3 InGaP [0008]), an active layer (fig.1 #4 [0008]) and a second clad layer of a second conductivity type (fig.1 #5 [0008]) that are formed over a semiconductor substrate (fig.1 #1 [0008]), wherein a portion of said active layer in an area near a laser resonator end face has a peak wavelength in photoluminescence (PL) that is smaller than a peak wavelength in PL in a portion of said active layer in a laser resonator inner area ([0003-5] disordering around edges leads to lower PL wavelength when compared to non-disordered inner laser resonator portion), and the second clad layer of the second conductivity type located in the area near a laser resonator end face contains As atoms (fig.1 #5, As taught as an impurity source [0004]).

With respect to claim 2, Kiyohisa discloses the As atom concentration in the second clad layer of the second conductivity type in the area near a laser resonator end face is higher than an As atom concentration in the second clad layer of the second conductivity type in the laser resonator inner area (fig.1, As implant only on edges, so area near resonator would inherently have more As than a central portion of the laser resonator).

With respect to claim 9, Kiyohisa discloses a GaAs current non-injection layer of the second conductivity type is formed over the second clad layer of the second conductivity type in the area near a laser resonator end face (fig.3 #27).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 3, 16, and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kazumasa in view of Ueno et al. (EPO 0437243A2).

With respect to claim 3, Kazumasa teaches the semiconductor laser device as outlined in the rejection to claim 1 above, but does not teach the As implant concentration to be between 1E18 and 1E20. Ueno teaches a semiconductor laser device with disordered regions wherein the implant concentration is taught to be 1E17

or greater (col.4 line 2) and of As (col.6 lines 9-17). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the laser device and As implant of Kazumasa with the As implant concentration level of Ueno in order to allow for a high amount of diffusion and disordering of the active region to sufficiently increase the bandgap energy (Ueno, col.4 lines 1-5).

With respect to claim 16, Kazumasa and Ueno teach the laser device as outlined in the rejection to claim 3 above, and Kazumasa further teaches the impurity atoms having the second conductivity, contained in the second clad layer of the second conductivity type in the area near a laser resonator end face, are the same as impurity atoms having the second conductivity contained in the second clad layer of the second conductivity type in the laser resonator inner area (second clad layer #24 doping taught to be same throughout entire structure).

With respect to claim 19, Kazumasa and Ueno teach the laser device as outlined in the rejection to claim 3 above, and Kazumasa further teaches a GaAs contact layer of the second conductivity type formed over the clad layer of the second conductivity type in the area near a laser resonator end face and the laser resonator inner area (fig.3 #29, GaAs [0060]), and a GaInP intermediate layer of the second conductivity type formed between the second clad layer of the second conductivity type and the GaAs contact layer of the second conductivity type in the laser resonator inner area (fig.3 #25, InGaP [0035]).

Claims 5-6, 17-18, and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kazumasa in view of Paoli et al. (US 5140605).

With respect to claims 5-6, Kazumasa teaches the semiconductor laser device as outlined in the rejection to claim 4 above, but does not teach the impurity doping atoms to be Beryllium (Be). Paoli teaches a disordered region device which outlines the use of Be as a beneficial impurity type (col.8 lines 7-8). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the laser device and impurity doping of Kazumasa with the Be impurity type of Paoli in order to have better control over the diffusion depth of the impurity source (Paoli, col.8 lines 7-14).

Claims 17-18 are rejected for the same reasons outlined in the rejection to claim 7 above.

Claim 21 is rejected for the same reasons outlined in the rejection to claim 8 above.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any

extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tod T. Van Roy whose telephone number is (571)272-8447. The examiner can normally be reached on M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Minsun Harvey can be reached on (571)272-1835. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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